Beta1 integrin establishes endothelial cell polarity and arteriolar lumen formation via a Par3-dependent mechanism.

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Public Summary:

Scientific Abstract:
Maintenance of single-layered endothelium, squamous endothelial cell shape, and formation of a patent vascular lumen all require defined endothelial cell polarity. Loss of beta1 integrin (Itgb1) in nascent endothelium leads to disruption of arterial endothelial cell polarity and lumen formation. The loss of polarity is manifested as cuboidal-shaped endothelial cells with dysregulated levels and mislocalization of normally polarized cell-cell adhesion molecules, as well as decreased expression of the polarity gene Par3 (pard3). beta1 integrin and Par3 are both localized to the endothelial layer, with preferential expression of Par3 in arterial endothelium. Luminal occlusion is also exclusively noted in arteries, and is partially rescued by replacement of Par3 protein in beta1-deficient vessels. Combined, our findings demonstrate that beta1 integrin functions upstream of Par3 as part of a molecular cascade required for endothelial cell polarity and lumen formation.